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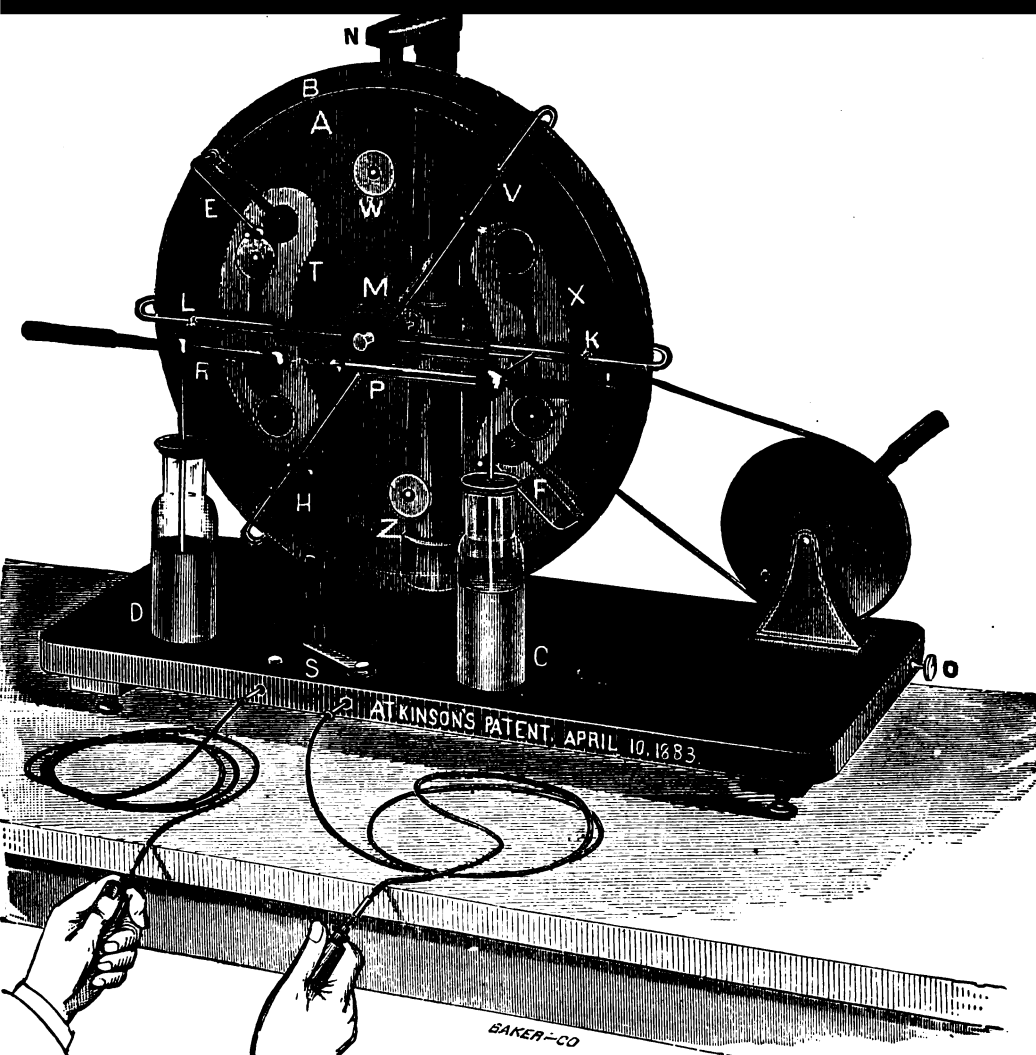
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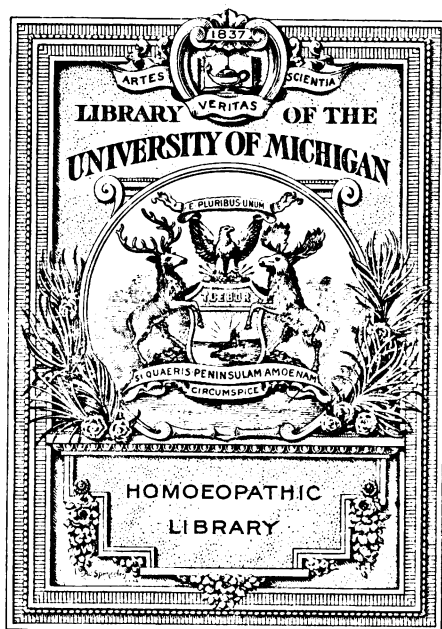
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Medical electricity ...

Harlan Pomeroy



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P 78

MEDICAL ELECTRICITY,

A LECTURE DELIVERED BEFORE
THE HAHNEMANN SOCIETY,
ON THE EVENING OF JAN. 19, 1886.

BY

HARLAN POMEROY, M. D.,

ADJUNCT PROFESSOR OF PHYSIOLOGY IN THE HOMŒOPATHIC
HOSPITAL COLLEGE.

PUBLISHED BY REQUEST OF THE SOCIETY.

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CORRESPONDENCE.

CLEVELAND, OHIO, Jan. 29, 1886.

HARLAN POMEROY, M. D.

Dear Sir:—The members of the Hahnemann Society of the Homœopathic Hospital College desire to express their great appreciation of your lecture, delivered to them on the 19th inst., upon the now very prominent and important therapeutic agent "Electricity;" and with the object of more permanently preserving for themselves its teachings, and enlarging its field of fecundity, unanimously and respectfully beg of you to favor them with a copy for publication.

HARLAN T. KERR, }
T. C. MARTIN, } Committee.
C. S. ELLIOTT, }

526 PROSPECT STREET,
CLEVELAND, O., Feb. 1, 1886.

Gentlemen:—Your favor of the 29th ultimo, requesting a copy of my lecture on Electricity, for publication, is received. Recognizing, as I do, that the subject of electricity should be carefully studied, and its application as a remedial agent thoroughly understood by every physician, I willingly comply with your request to submit a copy for publication, with the hope that the few hints therein contained may act as an incentive to your further investigation of this interesting subject. Assuring you of my appreciation of the kindly reception accorded the lecture by yourselves and the other members of the society, I am,

Yours respectfully,

HARLAN POMEROY.

To Messrs. HARLAN T. KERR, }
T. C. MARTIN, } Committee.
C. S. ELLIOTT, }

H 615.84

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MEDICAL ELECTRICITY.

Ladies and Gentlemen:

Having been requested by a committee, representing Hahnemann Society, to present the subject of Medical Electricity this evening, I take pleasure in submitting briefly a few of the main points in regard to this important subject.

After reviewing to a limited extent the principles of electricity, we will endeavor to investigate the modes of generating and exhibiting it as a remedial agent, together with the most common affections indicating its use.

As a remedial agent in many forms of disease, electricity has, more especially of late, assumed such an important position—a position rendering it worthy of being termed a polychrest—that the study of its nature and its action upon the human system in health and disease, is absolutely essential to an earnest physician or surgeon who has a regard for the best interests of his patients. For the truths respecting the merits of electricity as a curative measure are as certain to prevail as was the truth “brought from darkness to light” by the revered Hahnemann, concerning the Homœopathic law of cure. It is a generally recognized fact, now, among the leading members of the medical profession, not only that this peculiar, subtle, potent force is a vast aid in connection with the indicated remedy in removing diseased conditions, but that it is likewise capable of relieving, arresting and curing painful and serious symptoms and abnormal conditions not possible to reach by remedies as usually exhibited.

Inasmuch as electricity is “useful, useless or injurious,” according to its source and the methods adopted for its administration, it should *never* be employed without the advice of a competent physician, nor persistently continued without the intelligent observation, by a physician, of its temporary and permanent effects. The reputation of electricity has undoubtedly suffered from unskilled applications by charlatans. The custom prevailing

among certain members of the medical fraternity of advising individuals to purchase batteries for indiscriminate use, should be deprecated, for a large proportion of those who invest in batteries are as absolutely ignorant of the principles of their construction as they are unskilled in the employment of them, so that the practical applications are made without proper discrimination and care. Unfortunately this is too true, not only of the laity, but also of many members of the medical profession, for we frequently meet with persons using the various forms of electricity upon themselves and others, who are unable to distinguish between a galvanic and faradic current. To employ electricity successfully, as a curative agent, it is necessary that the operator understands, not only the instrument employed, but also should he possess a thorough knowledge of diseased conditions, for, in a majority of cases, precision in diagnosis is the basis of a cure.

It has been truly remarked that successful and honest electrotherapy requires much time and skill. As well think of placing the hypodermic syringe with its deadly drug accompaniment into the hands of your patients for general use, simply because it is such a valuable adjunct to the physician's armamentarium when indicated, as to advise every one who may be in need of the healing influence of electricity, to buy a battery and use it.

While we recognize electricity as such a wonderful and estimable aid to the physician, and admit that within the limits of its power it is unequalled as a remedial agent, no one, surely, who thoroughly understands disease and the measures employed for its relief, will regard this or any other agent as a "cure all," for its curative powers must necessarily be modified by the pathological conditions existing in each individual case. Some 2500 years since, it was discovered that amber, when rubbed, possessed the power of attracting and repelling light objects. Various theories were suggested to account for these phenomena, from the superstitious idea that the manifestations were due to the presence of a soul, to the theory that these results were due to a mode of motion, to which the name electricity, from the Greek word *electron* (meaning amber), was assigned by Gilbert, of England, nearly 300 years since. It was he who first thoroughly investigated the subject.

In order to properly appreciate the subject of electricity as a therapeutic measure, a general understanding of the main properties of this agent is necessary.

Electricity manifests itself in various ways. Still it is essentially the same force however it may be generated, whether in the form of the so-called frictional, chemical, animal or magnetic electricity. Notwithstanding it is primarily the same force, its effects upon the system vary greatly, depending upon its source and mode of application; for whatever its source it may be modified by various appliances.

Electricity may be obtained not only by friction of certain substances, such as amber, glass, etc., but also by chemical action and heat. In short, it may be said that all molecular disturbances, whether mechanical or chemical, produce electricity, although it may not always be readily discernible. When an object is subjected to the action of heat, electricity is set free, and this tends to pass from the heated to the cooler parts. This is beautifully illustrated in the action of the sun in heating the earth. During its revolutions there is constantly being presented a new surface of the earth to the direct action of the sun; hence there is a constant flow of electricity from the heated to the cooler parts—from the east to the west. The earth, thus constantly traversed by a current of electricity around it, has been compared to the magnet, around which a galvanic current is constantly passing. Furthermore, it is a fact that a freely moving magnet will always tend to assume a position at right angles to a current of electricity passing near. Thus is explained the former mysterious phenomenon—the pointing of the magnetic needle to the north. The needle, following this law of electricity, assumes a position at right angles to this current of electricity passing from east to west.

If a glass rod be rubbed with a piece of cloth, and presented to some light substance, it will be observed that the latter article is at first attracted to the glass, but soon repelled (when the article becomes charged with the electricity). To this unseen influence is given the name vitreous, positive or plus electricity, with the symbol $+$. Now if a piece of resin be rubbed and presented to the substance just repelled by the glass, the article will be drawn towards the resin, and, as before, after a short time repelled. This is known as resinous, negative or minus electricity, with the symbol $-$.

Anything, then, charged with positive electricity attracts either neutral bodies, or those charged with negative electricity, repelling those positively charged. This action is reversed with objects

negatively charged. Or, briefly expressed, substances electrified either positively or negatively attract those of neutral or opposite electrical state, repelling those charged with the same form of electricity.

One theory of this phenomenon is that during the friction of the glass the positive fluid goes to the glass, the negative to the cloth, and vice versa with the resinous substance. (In the use of the term fluid in the consideration of electricity, simply a wave of motion is referred to, which for convenience is called fluid or current). This is known as the two fluid theory, and by the adherents of this theory it is claimed that in the normal state the two forms of electricity, $+$ and $-$, balance, or that they are in a state of equilibrium, there being consequently no manifestation. On the other hand, when this equilibrium is disturbed, one form must exist in excess, and as there is always a tendency to restoration of the normal condition (for the two forms of electricity to balance), the electricity existing in deficient quantity attracts from the one in excess sufficient to make up the deficiency ; hence the manifestations observed.

Another theory—the single fluid theory—is that only one form of electricity exists and that when a body is positively charged it possesses more electricity than naturally belongs to it, while in the negative state it possesses less than normal. This difference is known as potential. The higher potential is positive, and the electricity always passes from the higher to the lower potential, as water tends to flow from a higher to a lower level. The two substances repel each other because they are already over-charged, while if one is positively and the other negatively electrified, they attract each other because they can exchange and thus become equalized, i. e., assume the same potential. This theory coincides with the generally recognized fact that electricity always travels from the positive to the negative pole.

If some metal readily acted upon chemically—such as zinc—be subjected to the action of dilute sulphuric acid, the metal will be decomposed, and during the decomposition electricity is produced. This is designated as chemical electricity, in contra-distinction to a mechanical form produced by friction, which is illustrated in the production of the Static machine, where the electricity is generated by the friction of revolving plates of glass. This is the same in character as atmospheric electricity which

produces the spark, or lightning and the snap, or thunder—the noise resulting from the vibration of the air as it rushes in to fill the vacuum caused by the passage of the electric current.

By the term Animal Electricity is indicated that form possessed by many animals. A familiar example of this form of electricity may be found in the so called electric eel, which is notorious for the quantity of electricity emitted. Man possesses this force to a considerable extent. The electricity in man is usually positive when in health. While the free electricity of the body is ordinarily quite feeble, as to its intensity, it is not uncommonly emitted in sufficient quantity to produce a spark and to ignite gas.

Electricity during its passage through the body may produce marked physiological effects. It has been employed to a certain extent for centuries as a curative agent, but it was not until within the last few years that it began to receive the attention and study from members of the medical profession that its vast resources demanded. Now, to one whose attention has not been specially directed to the matter, it is surprising to note the rapid strides made in this branch of science within a comparatively short time, and the more the subject is investigated by one who understands and appreciates the Homœopathic law of cure, the more thoroughly will he be convinced that in bringing about a cure of a diseased condition, electricity acts according to the law of cure, expressed by the phrase so familiar to you all, "*Similia Similibus Curantur.*" That is, electricity is capable of producing certain symptoms in the healthy subject which are similar to symptoms in the diseased subject that this agent relieves. Lightning has been known not only to cause, but likewise to cure paralysis. This theory in regard to the law of cure, however, requires more elaboration.

The most commonly employed methods of generating and administering electricity as a remedial measure, will be briefly considered. *Franklinism*, so called in honor of Benjamin Franklin, one of the earliest to thoroughly investigate and give prominence to it, refers to a form of electricity known as Static, because at rest; or frictional, because in this manner produced.

Fig. 1 will give a fair representation of the Static machine used by myself. It consists of a four-plate Topley apparatus capable of producing, easily, an eight or nine inch spark. Of these four glass plates, two are stationary and two revolving. This apparatus is inclosed in a glass case to protect from dust and

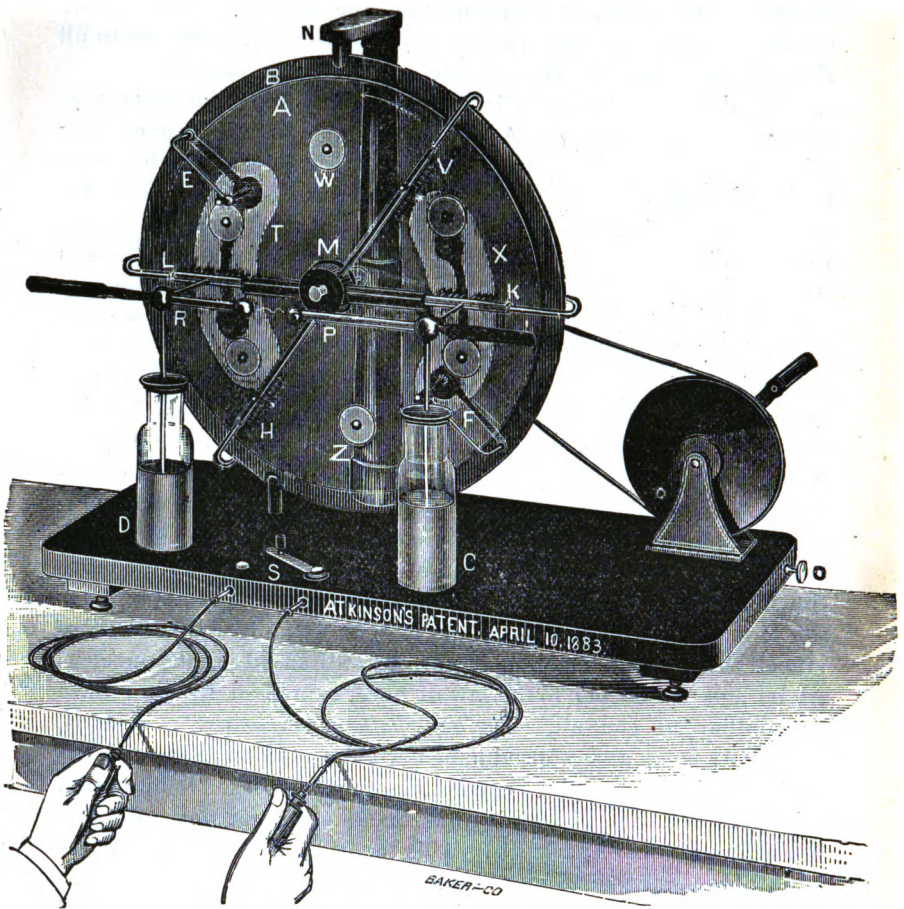


FIG. 1—ATKINSON'S TOPPLER ELECTRIC MACHINE.

dampness. Entering into the structure of this machine, also, are two Lyden jars, several wire brushes, combs and connectors; the power employed in running the machine being a small water motor, which secures the smooth, uniform motion so desirable. Accessory to the machine are a platform insulated by hard rubber legs, this is provided with a chair to be occupied by the patient; also special electrodes with rubber handles for insulation, rendered necessary by the great tension of this form of electricity. By tension, is indicated the capacity of a current to overcome resistance,

and thus leap a greater or shorter distance in order to become equalized. In many diseased states the effects of this form of electricity are more prompt and satisfactory than in either the galvanic or faradic. Static electricity is certainly a remedial agent of great value. With it, either a stimulant, tonic or sedative effect may be produced as desired.

In the therapeutic application of this form of electricity, the patient occupies the insulated platform to which the electricity generated by the revolving glass plates is conveyed, thus thoroughly electrizing the subject, either positively or negatively.

From the patient thus charged, the electricity may be drawn off in various ways, such as a spray, produced by presenting within a few inches of the patient, a metallic point connected with the earth by a chain; the electric wind, when drawn off with a large sponge; or spark, when a ball is thus employed; again, the electricity may be allowed to diffuse itself into the surrounding atmosphere, varying the method according to the effect desired. Notwithstanding this is such a powerful apparatus, it is under delicate and complete control.

An induced current may also be generated by this machine, as discovered by Dr. Morton, of New York. This comes from the outer coatings of the Leyden jars. The effects of this current are quite similar to the secondary faradic current, exciting muscular contraction with little or no pain. This apparatus is capable of producing large quantities of ozone, a valuable adjunct to the list of *remedial measures*. The static electricity possesses some self-evident advantages, one of the principal of which is that it can be applied to any or all parts of the body, without the necessity of removing or disarranging the clothing, an impossibility with the other forms of electricity. Thus, it is possible to administer a perfect electric bath without the inconveniences attending the water bath. This form of application is absolutely free from shock or disagreeable sensation, and is adapted to the most sensitive and delicate conditions. I have been gratified with the promptness with which this form of electricity will cure paralysis, neuralgia, sciatica, lumbago, chorea, and chronic rheumatism; also, many forms of nervous disorders, among which are nervous exhaustion, spinal irritation, headache, backache, or general weakness. Many people resort to the insulation treatment solely for its refreshing or tonic effects. The general application is oft-times far more beneficial than the ordin-

U O P N

ary electric bath, inasmuch as it stimulates slightly and produces a strengthening effect and does not depress the system, thus rendering the subject liable to chill upon going into the open air, as is frequently the case in the water electric bath. The static or insulation treatment, likewise quiets the nervous system, thus aiding circulation, respiration, digestion and nutrition.

Paralysis may be relieved and the function of an organ restored by means of a spark; so, also, may muscular rigidity and contraction give way under its influence. Frequently, when other methods of relief utterly fail, this will arouse the flagging energies and restore to perfect health. The *modus operandi* whereby diseased conditions yield to the influence of electricity may not be entirely clear. It is quite evident that the curative action is not due simply to the direct stimulant, tonic, anodyne or sedative qualities, but also to the fact that by this means electricity may be furnished as required by the system, thus equalizing the potential. The electrical condition of the patient may thus be changed by administering either a positive or negative charge.

The electric condition of the atmosphere, as a causative or aggravating influence upon diseased action, has not received the attention that its importance would warrant. Many people, without divining the reason therefor, have noted the fact that headache and other unpleasant sensations frequently occurred prior to a thunder storm. This is due to the electric influence. Thus, in a condition in which the atmospheric electricity at the earth's surface is predominantly in the positive or negative state, marked effect may be noted upon the diseases prevailing. It is claimed by some that the proximate cause of disease is electric change, the type depending upon the polarity. For instance, a long continued positive condition of the atmosphere predisposes to diseases of an active nature—sthenic fevers, etc.,—while if this state prevail in moderation, a tonic effect results. If the opposite condition prevails, a lowered vital action results; hence neuralgia and low fevers are most prevalent. This accounts for the fact that a long continued or marked negative condition of the atmosphere is called unhealthy.

In certain states of the atmosphere the negative condition is so excessive that it is almost or quite impossible to generate sufficient electricity with the static machine to produce a spark. It is during such a time that diseases alarmingly prevail.



One theory of the cause of the so-called "nervous diseases" is that there is some obstruction to the nervo-electric force of the system.

By equalizing this discrepancy, by restoring the equilibrium, unhealthy action may be changed to healthy, and so, in case the potential of the human system can be regulated, a decided influence may be exerted over the body functions, and thus health may be restored.

The disadvantages attending the adoption of the static machine by the general practitioner are, the great expense of the apparatus, together with the fact that it is not portable, thus only available for office use.

Galvanism or Dynamic Electricity, unlike static, is electricity in motion. This is illustrated in the electricity produced by a galvanic battery.

The galvanic current, so named in memory of Galvani, of Italy, who first discovered it in 1780, is also styled the battery or direct current, because flowing directly from the battery; constant or continuous, because not interrupted; voltaic, because Volta discovered a new and powerful method of producing this current, viz.: the voltaic pile.

This form of electricity is generated by decomposition. For this reason it is denominated chemico-electricity.

Zinc is most frequently employed as the generating element, while copper or carbon is used as the conducting element. If a plate of zinc and copper be immersed in a solution of sulphuric acid (or other exciting fluid), and the plates connected by a conductor outside the solution, chemical action commences; the zinc is decomposed and electricity set free, which travels through the solution to the copper plate, thence by the conductor back to the zinc, thus forming a circuit. If the human body, or any part of it, is placed between the electrodes connected with the elements of a galvanic battery in action, the electric current will pass through the body, entering at the positive pole or anode, emerging at the negative pole or cathode. As indicated, the zinc is the element acted upon, and generates positive electricity, hence is called the generating or positive plate. The wire or conductor connected with the positive plate becomes the negative *pole outside the solution*, and in like manner the conductor attached to the copper or negative *plate* becomes the positive *pole* outside the solution. Thus the

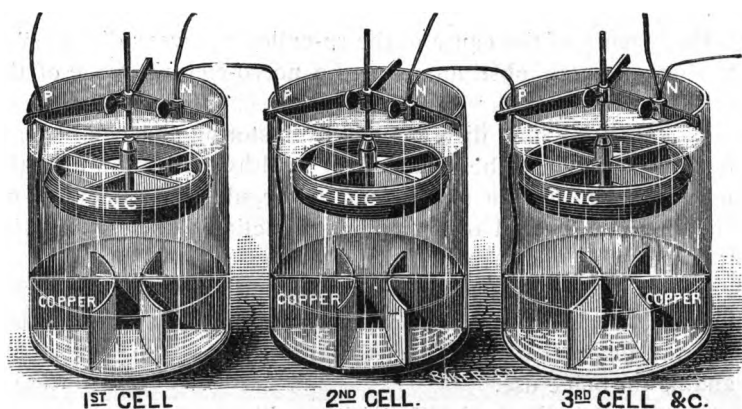


FIG. 2—GRAVITY BATTERY.

current always passes from the positive to the negative pole, from the higher to the lower potential.

The gravity galvanic battery, three cells of which are illustrated by Fig. 2, consists of large glass cells, each capable of holding about a half gallon. The generating and conducting elements are zinc and copper. This is named the gravity cell because the cell contains two solutions, of different density—a solution of sulphate of copper, which, by reason of its greater specific gravity, retains its relation in contact with the copper plate at the bottom of the jar, this solution is of blue color; the solution of sulphate of zinc, by the mere fact of its lesser specific gravity, floats on top of the copper solution, immersing the zinc plate, this solution is colorless. A battery consisting of thirty-six of these cells is employed by the writer for office applications, it is of the McIntosh make, a superb apparatus in every respect. The quality of the electricity generated is excellent, the quantity all-sufficient. While the sensible impressions are mild, the effects are deep and permanent.

This battery does not polarize, as the copper solution is decomposed—when the circuit is closed—into copper and sulphuric acid; the copper being deposited upon the copper plate, while the sulphuric acid passes to the zinc, with which it combines, forming sulphate of zinc. To maintain the cells in order, it is only necessary to add sulphate of copper from time to time, and water, to supply that lost by evaporation.

The gravity battery is vastly superior to any other for office use, being simple in construction, economical and easily managed.

The table plate belonging to this thirty-six-cell battery is represented by Fig. 3. The switches are so arranged that any number of cells, from 1 to 36, may be brought into the circuit together, or any continuous number of the series may be used. For example, if cells 1 to 12 become weakened from any cause, the switch may be instantly changed so as to make cell 13, or any other cell desired, the starting point. In addition to the switch, the table plate

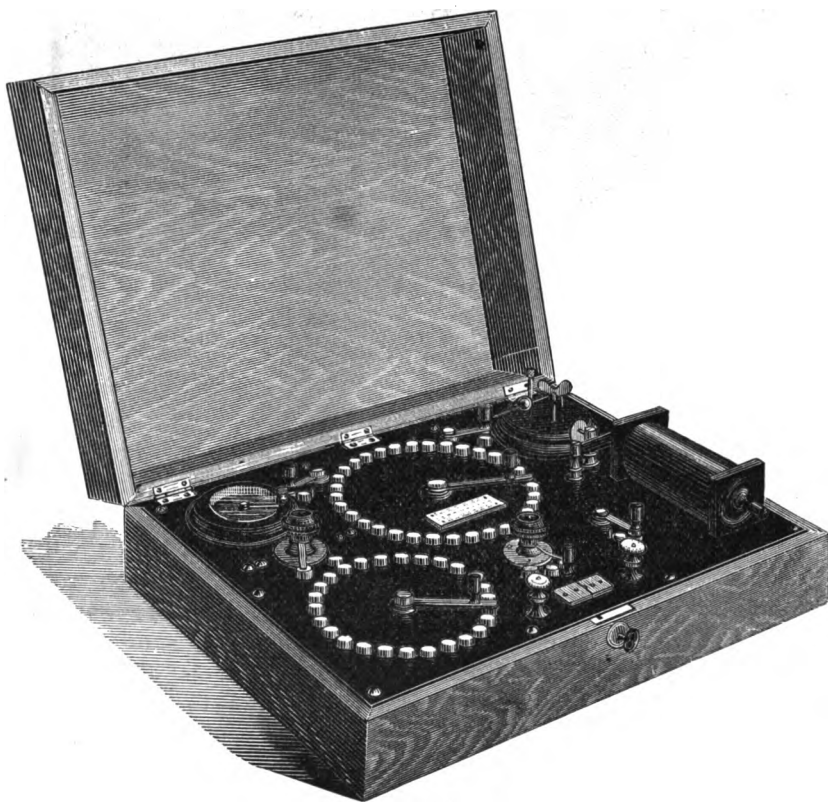


FIG. 3—McINTOSH TABLE PLATE.

contains an automatic rheotome for interrupting the galvanic current; a galvanoscope, for showing the presence or absence of a current, and to indicate its polarity; a pole-changer, commutator or rheotrope; and a rheostat, for introducing any desired resistance to the current, up to 2500 Ohms. Thus, the operator is enabled to modify the tension of the current so that it may be taken by the

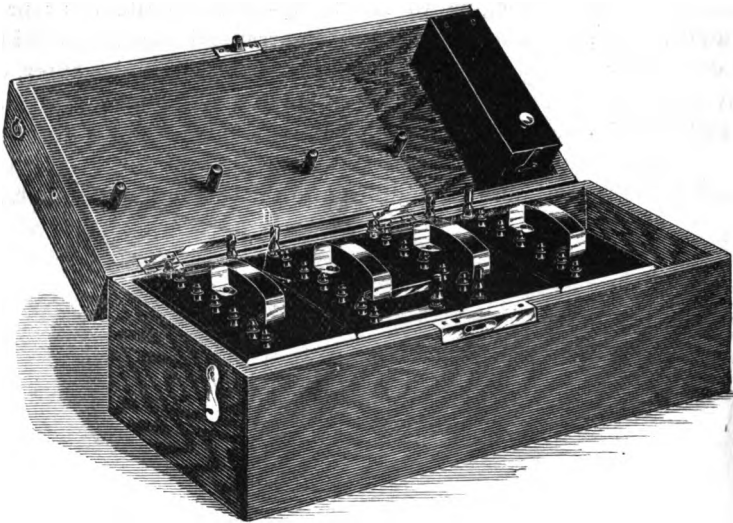


FIG. 4—McINTOSH TWENTYFOUR-CELL GALVANIC BATTERY.

most sensitive. The faradic coil, with its proper accessories, also occupies the table plate.

A smaller but portable battery is illustrated by Fig. 4.

A battery may be composed of any number of cells, but the method of generating the electricity is practicably the same. This form of electricity produces powerful chemical changes in the body tissues through which it is diffused, thus differing from the static, which accumulates upon the surface of the body. Muscular contraction or pain is produced only when the circuit is made or broken, unless the intensity is very great. The action is especially marked at the negative pole, where it is capable of separating the constituents of the body when the intensity is great. If a galvanic current be caused to pass through a saline solution, the solution will be decomposed, when the acids and oxygen will collect at the positive pole, the alkalies and hydrogen at the negative pole. This is known as electrolysis. This chemical alteration takes place in the human system when a galvanic current is caused to pass through it, for the body really consists of a mass of cells composed of saline matter and water, hence the readiness with which the system yields to electrolysis. In this manner is explained the action of electricity in removing goitre and other tumors, as well as mothers' marks, urethral strict-

ure, and in causing absorption of old exudations in various parts of the body. Aneurism may also be cured by this current, by causing coagulation of blood in the sac. Electrolysis is resorted to in removing hairs, and in destroying the life of an ovum in extra-uterine pregnancy.

When the poles of a galvanic battery are connected with a small platinum or other poor conducting wire, which is incapable of conducting the electricity as rapidly as it is generated, the wire becomes heated. This fact is utilized in the galvano-cautery, by which we may cause excision and destruction of morbid growths, etc. But, it should be borne in mind that the heat producing qualities of the current only are brought into use here, the current not passing through the parts cauterized. A cautery battery differs from an ordinary galvanic battery, inasmuch as it has very large plates placed closely together. In this way the quantity of electricity is greatly increased.

Two properties enter into the consideration of the electric force, i. e., quality and quantity. The quality or intensity and chemical action of a galvanic current depends upon the number of elements composing the battery, while the quantity, together with its heat-producing effects, depends upon the size of the elements. The galvanic current may thus be variously modified; while it is naturally a continuous current, it may be constituted an interrupted current by means of a rheotome.

When a paralyzed muscle fails to respond to the faradic current by contracting, it frequently is fully restored in function by the galvanic current. Aside from the stimulant action upon muscles when the current is interrupted, it also produces an action, when continuous, known as catalysis, in which condition the nutrition of a tissue or organ is influenced. This may be termed the constant, powerful but silent current, although, when mild, it is scarcely perceptible, it is capable of producing wonderful results.

Not only is the galvanic a continuous current, but each pole has its special therapeutic action. As a rule, to which there are some exceptions, the positive pole soothes and relieves inflammation and pain, while the negative stimulates, excites and is more harsh and irritating. You will remember that the current emerges from the body at the negative pole, and that it is the negative pole that causes most chemical action and pain. This action of an electric current has been happily compared to the effects produced

by a bullet passing through the body, in which case, as you well know, the greatest lesion exists at the point where the bullet passes out of the body.

In applying galvanism, care should be exercised that the current is not too strong or too long continued at a sitting. Better too weak than too strong, because the former could be remedied by repeated applications, while the damage might be beyond repair if the current were too strong. It is desirable to commence with a mild current, increasing cautiously, thus exercising care to avoid shock. Of course the strength and duration of an application will depend upon circumstances; but usually from ten to fifteen seconds application of a mild current to sensitive parts—as about the head,—to as many minutes of a stronger current to parts less sensitive will suffice.

The frequency of the applications must necessarily vary, depending upon the nature of the case; in some cases it may be used for a time every day, in others every two or three, or every week, and in certain chronic diseases it is occasional beneficial to discontinue treatment for a time, and then resume again.

Faradism, named after Faraday; known also as the induced or interrupted current, or electro-magnetism, is another form of dynamic electricity. While the faradic current may be, and frequently is generated by the same elements that generate the galvanic current, still it differs widely from that current in its properties and therapeutic effects; for, while the galvanic is a continuous current flowing in one direction, imperceptible except when the circuit is completed or broken, the faradic is an indirect induced current, an interrupted and a to-and-fro current. The current from the generating cell being modified by passing through an helix inclosing a bar of soft iron or bundle of soft wire; or rather, this core of soft iron becomes magnetized during the continuance of the generating current, becoming demagnetized as the circuit is broken.

The essential feature of induction is this: That conductors traversed by electric currents *induce* currents in other conductors in their immediate vicinity. At the instant of *closing* the circuit of the inducing current, a current in the second coil is induced, which passes in an opposite direction to that of the inducing current. As the circuit of the inducing current is *opened*, the induced current is in the same direction as the inducing. Now,

the primary induced current is a result of the magnetism imparted to this core within the helix, for as before explained, when the current passes over the helix the core becomes magnetic, and when the iron core becomes and ceases to be magnetic, it induces an electric current in the spirals of wire surrounding it. In like manner the current in the secondary coil is entirely due to the inducing action of the primary coil, simply by proximity. This current possesses a higher tension and greater penetrating power than does the primary. The make and break of the circuit is caused by an armature of iron, an automatic device called a rheotome, attached to a spring; as the circuit is closed the core becomes magnetic and attracts the armature away from its connection, thus breaking the circuit, when the induced current is established.

The direction or polarity changing every time the circuit is made or broken, it is this current that passes through the electrodes to the patient, while the battery current simply induces this current; a draw tube serves to regulate the intensity of the current. This core is called an electro-magnet. Thus originates the term electro-magnetism, assigned to this form of electricity.

Hence the distinction between the galvanic and faradic currents.

The shorter and thicker the wire constituting the coil, the greater the quantity of electricity, while the quality or intensity is diminished. On the other hand, the longer and finer the wire, the less the quantity, while the intensity is increased. Intensity may be illustrated by the passage of water through an hose nozzle. If the size of the opening be diminished, the stream becomes more dense, that is, there is a diminished quantity, but the force or intensity is increased.

The faradic has much more marked effect in producing muscular contraction than has the galvanic, but does not possess the chemical or electrolytic action. The relation of the helix to the galvanic current has been likened to the relation of a microscope to an object, inasmuch as it greatly magnifies, develops, increases and intensifies it. The faradic current is frequently employed as an aid in diagnosis; here electricity gives us a precision attainable by no other means; it aids in determining between various troubles resembling one another; in arriving at the cause of paralysis, whether central or peripheral; in detecting malignancy; and to

establish the fact of death, as muscles lose their power of contracting under the stimulus of the faradic current in about three or four hours after death has occurred.

Another valuable property it possesses is the power to produce artificial respiration, which power is resorted to when respiration has ceased from any cause, such as the use of anæsthetics, suffocation, drowning, poisoning, etc.

The Kidder Tip battery, Fig. 5, is an elegant faradic battery for general office use.

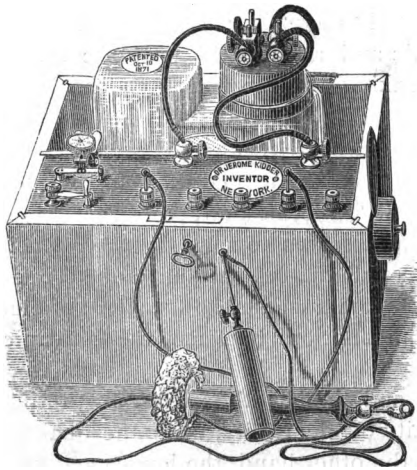


FIG. 5.

The Gaiffe, Fig. 6, is likewise a battery in general use by the writer, and much admired as a pocket battery.

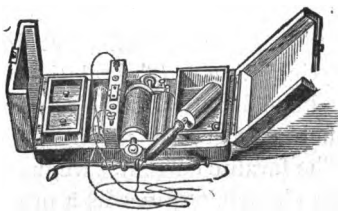


FIG. 6—A. GAIFFE'S FRENCH FARADIC POCKET BATTERY.

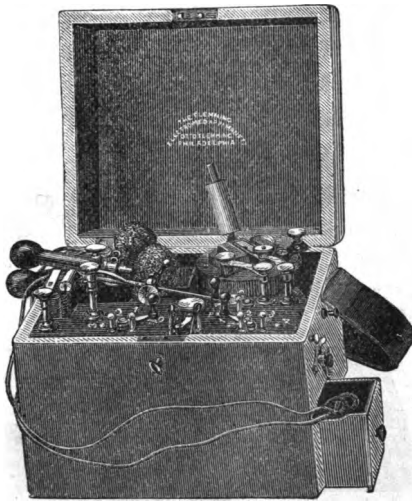


FIG. 7—FLEMING FARADIC BATTERY, No. 3.

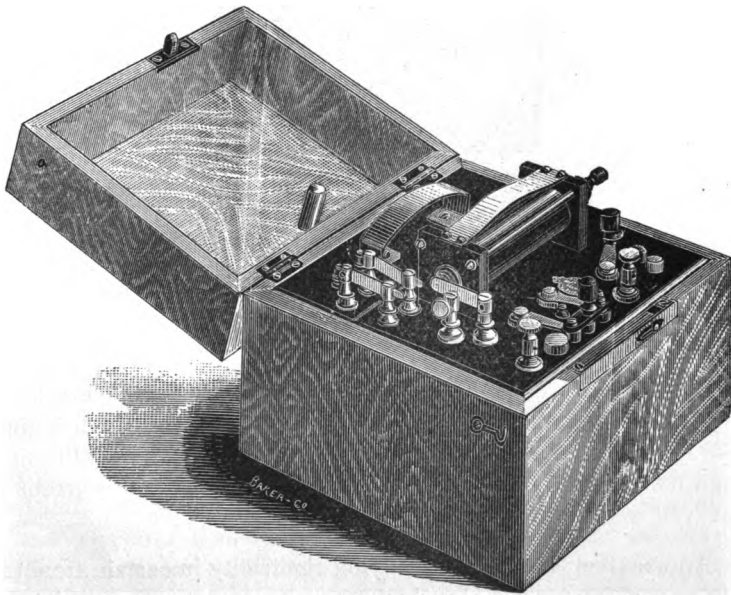


FIG. 8—MCINTOSH PHYSICIANS' FARADIC BATTERY, No. 3.

The Otto Flemming Battery, Fig. 7, is one of the most complete and satisfactory manufactured. The quality of the current being especially pleasing.

Figure 8 is an admirable instrument also.

MODE OF APPLICATION.

Electrodes of various forms, such as sponge holders, brushes, balls, points, disks, etc., with some that are adapted to special organs, such as the eye, ear, urethra, uterus, etc., as illustrated by Fig. 9, may be attached to the rheophores or flexible conducting

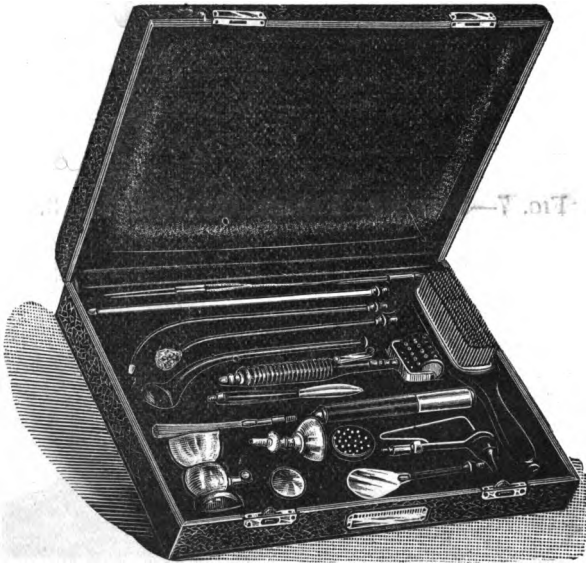


FIG. 9—ELECTRODES IN CASES.

wires. These are connected, the one to the generating element of the battery, the other to the conducting element, and by bringing these electrodes into contact with various parts of the body through which it is desired to cause the electricity to pass, the current is conveyed from battery to patient.

An excellent method of applying electricity in certain troubles is through the operator. In which case the operator places his own body in the circuit by grasping an electrode with one hand, with

the other rubbing the affected part. The circuit being completed by placing the other electrode upon some part of the patient's person.

The electrodes, with the exception of the wire brush, which is intended to act upon the skin, should be covered with chamois-skin, sponge or Canton flannel. Preferably the latter as it may be frequently renewed. If it is desirable to act principally upon the skin, the electrode may be used dry, otherwise they should be moistened with salty or acidulated water, this diminishes the resistance offered by the skin very much; or, if a limb is to be subjected to the electric influence, it may be immersed in water in which is one electrode, the other being placed on some portion of the body, to complete the circuit; or, two dishes of water may be used, one for either limb, each containing an electrode. The larger the electrode, less the density of the current transmitted.

Usually one electrode is held by the patient while the other is applied over the affected part, generally so arranging the electrodes that the diseased part lies between them. An even, firm pressure should be kept upon the electrodes.

The electrodes may be confined to the same part of the body as when first applied. This is called the *stabile method*; while if one or both electrodes are moved over the surface of the body, it is designated the *labile method*.

General electrization consists in passing the current through the main part of the system, which may be accomplished by placing the feet upon a moist copper plate connected with one pole, the other electrode upon the head, neck or in the hand.

Localized electrization on the other hand consists in limiting the current as much as possible to certain organs or tissues, such as a limb, muscle or nerve. Much is said in regard to the use of the positive pole for the relief of pain, while the negative pole is used as a stimulant. This is true of the galvanic current, but not of the faradic, which is constantly changing its polarity. It is predominantly in diseases of a nervous type that electricity has gained its reputation, and probably no agent is more frequently indicated in these affections than is electricity, where its effects are not only brilliant, but often instantaneous. Notwithstanding the fact that the efficacy of this mode of treatment is frequently manifested at once, perhaps even at the first sitting, it must be remembered that in many

of the affections to which this treatment is particularly adapted, the diseased action has been going on for months or years, so that repeated applications, and sometimes months of treatment are required to accomplish the desired results. However, as will be noticed by referring to the list of diseases in which electricity has been successfully used, it is not limited in its action and is by no means to be restricted to these conditions; neither are the different *forms*—static, galvanic and faradic—confined in their action to the various diseases mentioned when considering them, but often any one of them may be employed or used in succession or alternation. Sometimes, too, a combination of the faradic and galvanic currents is employed, in which case the positive pole of the galvanic battery is connected by an rheophore with the secondary coil of the faradic battery, while the rheophores conveying the electricity to the patient pass from the negative pole of the galvanic and from the secondary faradic coil. Remarkable results are recorded as a result of this combination.

Aside from the affections mentioned as indicating the use of electricity, and in which it is of unmistakable benefit, we notice the following as a few of the prominent: Various disordered states of the brain, spinal cord and nerves, such as excessive nervousness, sleeplessness, hypochondriasis, hysterical conditions, vertigo, headache, epilepsy.

Spasmodic diseases, convulsions, writers' and telegraphers' cramp,

Paralysis of many varieties, as rheumatic, hysterical, infantile, etc.

Rheumatism, wasting and softening of the muscles, emaciation, pain in whatever location found.

Vomiting and dyspeptic symptoms.

Weakness of the sexual organs, kidneys or bowels.

Loss of voice, asthmatic and bronchial affections.

Deafness, weakness of the eyes from fatigue and other causes.

Certain skin affections, to produce local stimulation.

Vascular tumors, indolent ulcers, etc.

At times electricity must enter, as an important factor, into every department of medicine and surgery. Both the general practitioner and surgeon recognize its value, and on account of associated symptoms it is especially useful to the gynæcologist, being indicated in various uterine and ovarian troubles with their allied menstrual

disturbances, amenorrhoea, dysmenorrhoea, neuralgia, etc. This may be brought to bear upon the mammary glands, thereby dispersing tumors, or increasing development, and secretion.

The indications for its employment, of course, cannot be considered at this time.

Valuable as is electricity in the management of diseased conditions, it certainly should be used with the closest study and in association with proper hygienic and therapeutic measures.

All that could be attempted in so limited a period as we have at our command this evening, is a hasty sketch of the more important facts bearing upon this interesting subject, and if I may have succeeded in arousing or increasing the interest of the members of the society sufficient to induce them to pursue the study of this constantly growing remedial agent, I shall feel well repaid for the time thus occupied.

